Lesson Title: Now We’re Cooking!

Grade Level: 1

Objective: Students will:

1. Discover how the sun’s energy can be harnessed for our use.

2. Use the process of technological design to create a solar-powered method to cook a small piece of apple.

Background Information:
To reduce the dependency on fossil fuels, the use of alternative energy sources which are readily available to us should be investigated. Solar energy is one of the alternatives which need to be considered for future generations.
Big Ecological Ideas:

We rely on the constant flow of energy from the sun to live.

a) Most of the energy on the earth’s surface comes from the sun. In nature, the sun’s energy affects both living and non-living things.

b) The sun is crucial to our survival. It constantly warms the earth and the sea, giving us a habitable climate to live in. It makes the wind blow, and the rains fall. It also gives energy to all living things. The sun gives plants energy to grow and make food. People and animals then get their energy from eating plants and other animals. The energy from our food lets us grow, move and do work. Many people in the world use plant energy (e.g., wood) for cooking and to keep warm. When people cut down trees for wood to burn in their fireplaces, the energy stored in the wood changes form – and becomes heat!

c) It may seem surprising to realize that the electrical energy we need to run the devices we use each day – computers and lights – originated with the sun. The sun evaporates water from lakes and oceans. When it rains, some of the water is dropped on higher ground. Due to gravity, the water flows. Hydroelectric energy comes from the energy of this moving water. Our coal-produced electricity comes from fossil fuels whose concentrated energy is that of the sun stored in plants buried millions of years ago. Cars, too, run on a fossil fuel called gasoline. This is made from petroleum that, like coal, is derived from fossilized plants long buried and compressed into fuel under the ground.

Ontario Curriculum Expectations:
Science and Technology: Energy and Control: Energy in Our Lives

Is46 - demonstrate an understanding of ways in which energy is used in daily life
Is49 - recognize that the sun is the principal sources of energy used on the surface of the earth
Is50 - identify food as a source of energy for themselves and other living things
Is51 - identify everyday uses of energy (i.e., gas to heat our homes, electricity to cook our food)
Is53 - construct a manually controlled device that performs a specific task (e.g., a folding fan)
Is54 - operate a simple device or system and identify the input and output (e.g., a hair dryer: the input is electricity, the output is heat)
Is57 - use appropriate vocabulary in describing their investigations, explorations, and observations (e.g., use words such as electricity, lights, energy)
Is58 - record relevant observations, findings, and measurements using written language, drawings, concrete materials, and charts (e.g., create an energy poster illustrating the various forms of energy used in daily life and how they are controlled)
Im57 - use appropriate language to describe relative times, sizes, temperatures, amounts of money, areas, masses, and capacities (e.g., tallest, warmer)

**Prior Learning:**
The sun is the principal source of energy used on the surface of the earth.
Students should have discussed that we rely on the constant flow of energy from the sun to live.
Students should have discussed ways in which energy is used in daily life.
Students should be able to identify some everyday uses of energy.
**Question:** Can the sun's energy be used to perform work for us?

**Assessment Opportunities:**
The teacher observes and notes the student’s ability to:
- observe and discuss changes using science vocabulary
- record observations using illustrations and written explanation
- follow directions
- work cooperatively with a group
- investigate other places where energy is used to do something for us
- observe changes in a thermometer

**Assessment Strategies:**
- anecdotal records
- class presentation
- observation
- log/journal

**Time Frame:**
One day (2 to 4 hours cooking time)
Materials Needed:

1) Aluminum foil (available in Science Everywhere Supply Kit - Grade 1)
2) 4 paper cups (not waxed)
3) White paper
4) Black paper
5) Scissors
6) Newspaper
7) Apple slices
8) 2 Thermometers (available in Science Everywhere Supply Kit - Grade 1)
9) Tape
10) Plastic Wrap (available in Science Everywhere Supply Kit - Grade 1)
Procedure:

1. Line the inside of 2 paper cups with black paper.
2. Place a slice of apple in each of the cups.
3. Cover the tops of the 2 cups with plastic wrap.
4. Make 2 cones out of aluminum foil.
5. Wrap each cone around the cups with the apple slices inside.
6. Cover the bottom of each cup and cone with another cup to hold the cone in place.
7. Crumple newspaper around the bases of the outside of the cups. This serves as an insulator.
8. Aim the cookers at the sun.
9. Lower the thermometers into the cones.
10. Read and record the temperatures at intervals (to be decided upon by the teacher), during the cooking process.
11. Cook until the apple slices are done (approximately 2 - 4 hours).

(Another possible idea would be to make one cone out of aluminum foil and the other out of white paper, then compare the effectiveness of each insulator as the apple slices cook.)
Note: the arrows indicating the final assembly of the apparatus.
Result of Experiment: The sun’s energy can be used to perform work for us.

As a class investigate: ‘What Other Work Can the Sun Do?’

1. Using BLM 1, brainstorm other work the sun can help us do (e.g., heat homes, light the classroom, etc.).

   Follow-up A: Create a class poster “What the Sun Can Do for Us”.
   • Display, allowing students to add to the poster as they discover new jobs the sun can help us do.

   Follow-up B: Assign each student to create their own poster of “The Sun at Work For Us”.
   • Use BLM 2.

2. Ask the question: How much did it cost to cook this piece of apple?

   • Compare to the cost of one litre of gasoline.
     (Students can research gas prices in their neighbourhood over an evening and report back to the class.)

   • Using BLM 3, discuss possible alternatives to the high price of gasoline by harnessing the power of the sun.

   • Display for further discussion.
Notes to teacher:

Follow-up/Discussion Questions:

• kinds of measurements that were made during this experiment (heat, temperature, time of the cooking process)

• what students learned by doing this experiment

• other ways solar energy is harnessed for our use

• new ideas for using solar energy to work for us

• how solar energy might be used in the future (2205?)

Student Reading:

Sunlight for Our Life (BLM 10) may be used as a shared reading and put into chart form for use in a literacy centre. Using this, 'Key' students may fill in the story, “Sunlight for Our Life” (BLM 11).

Connections:

All energy comes directly or indirectly from two primary sources: the sun, or the fission and fusion of atoms. If we could fully harness one hour of sunlight it would meet the world’s energy needs for one year. Our technology is not advanced enough at this time to allow us to do this.

Sunlight is used to cook our food, heat our water and our homes, and to generate electricity. It is one of our cleanest sources of energy.
References:

Suggested Resource Websites:
From: Ontario EcoSchools: Energy Conservation by Grade (1-8)

Energy Flows- “The Sun’s Energy in the Food Chain”
A participatory exercise to demonstrate to young students how the sun’s energy moves through a living chain from plants, to small animals to larger predators. With a small piece of snack food as the “energy” that passes, students role-play the different creatures, and discuss how the chain works and what might make it work less well (e.g., losing species).
http://www.iit.edu/~smart/hearlyv/lesson1.htm

A brief, clear explanation of how the sun’s energy is made available in corn (plants) as food for people, then as food for animals, as direct fuel (burning), as a source of bio-gas for cooking, and as ethanol for vehicle fuel.
http://www.eia.doe.gov/kids/classactivities/PrimaryActivity.pdf

Web Links:

www.energyquest.ca.gov/

http://www.geocities.com/GradeOne_ca/Lessons/energy.html
Other Jobs The Sun Helps Us Do

Sun Energy

Other Jobs The Sun Helps Us Do

- Blank 1
- Blank 2
- Blank 3
- Blank 4
The Sun At Work For Us!

My Poster Plan
Solar Cooker
Science Discovery Journal
### Temperature (°C)

<table>
<thead>
<tr>
<th></th>
<th>Time: (e.g., 9:00 a.m.)</th>
<th>Time: (e.g., 12:45 p.m.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Cooker #1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar Cooker #2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Discuss temperature changes as the apples cook.
- Record observations/ideas in Discovery Journals.
BLM 6 – Anecdotal Observation Record Sheet

### Observation Record Sheet

<table>
<thead>
<tr>
<th>Observing:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Checklist for Creating a Poster

Name: ___________________________ Date: __________

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>-appropriate message</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-neat, large lettering for the title</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-large, colourful, appropriate picture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-entire space (paper) is used</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments: ____________________________________________
_____________________________________________________
_____________________________________________________
_____________________________________________________
_____________________________________________________
_____________________________________________________
_____________________________________________________
Checklist for Creating a Poster

• appropriate message

• neat, large lettering for the title

• large, colourful, appropriate picture

• entire space (paper) is used
### Checking My Group Skills

<table>
<thead>
<tr>
<th>Skill</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>I share my ideas with my partner or group.</td>
<td>🌟🌟🌟</td>
</tr>
<tr>
<td>I listened when others were speaking.</td>
<td>🌟🌟🌟</td>
</tr>
<tr>
<td>I took turns and shared materials.</td>
<td>🌟🌟🌟</td>
</tr>
<tr>
<td>I helped my partner or group to finish our work.</td>
<td>🌟🌟🌟</td>
</tr>
</tbody>
</table>

**Next time I will**

______________________________

______________________________

______________________________
Note to Teacher: #1

Try this exciting student-based activity as a follow-up to the Student Reading, page 3.

'The sun warms the earth’s atmosphere. This makes the air move around. When air moves we call that wind.”

When ‘wind’ enters a building through a cracks or windows, we call that a ‘draft’.

Students have the opportunity to be ‘draft detectives’ and locate areas where drafts occur. Teachers may also access the web site to extend this lesson to include the “Worm Warmers” activity to guard against the drafts they find.
**Draft-O-Meter**

Linda Gregory

_Urbita Elementary School, San Bernardino, Ca.
Adapted from the Tennessee Valley Authority_

**Objective:** Students will:

1. Learn an easy technique to measure the presence of drafts in their homes and classrooms.
2. In a follow-up exercise, students can create draft guards (see Worm Warmers lesson)

**Materials:**

1. Pencil
2. Tape
3. Plastic food wrap
Procedure:

1. Cut a 12 cm by 25 cm strip of plastic wrap.
2. Tape the shorter edge of the wrap to a pencil and let the rest hang freely.
3. Blow on the plastic wrap gently and note how sensitive the wrap is to air movement. Drafts mean that air is leaking into or out of a building. This means either a loss of heat in winter or a loss of air conditioning in summer.

Follow Up:

A. Students can complete the following "Home Draft Checklist" to assess where drafts are in their homes.

B. Have students complete the "Worm Warmers" activity to guard against the drafts they detected in this exercise.
### Home Draft Checklist

Check each of the locations where drafts are likely. Where your draft-o-meter detects drafts, rate them by checking the right column. Rate drafts as 1 (strong), 2 (moderate), or 3 (weak). If there is no draft, check the “no draft” column. If your home does not have a listed location, just draw a line through that location.

<table>
<thead>
<tr>
<th>Draft Location</th>
<th>No Draft</th>
<th>Draft Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Exhaust fans in bathrooms and kitchens</td>
<td></td>
<td>1 2 3</td>
</tr>
<tr>
<td>2. Dampers in fireplaces and woodstoves</td>
<td></td>
<td>1 2 3</td>
</tr>
<tr>
<td>3. Doors</td>
<td></td>
<td>1 2 3</td>
</tr>
<tr>
<td>4. Windows</td>
<td></td>
<td>1 2 3</td>
</tr>
<tr>
<td>5. Light fixtures attached to walls and ceilings</td>
<td></td>
<td>1 2 3</td>
</tr>
<tr>
<td>6. Attic door</td>
<td></td>
<td>1 2 3</td>
</tr>
<tr>
<td>7. Windows air conditioning units left in place in winter</td>
<td></td>
<td>1 2 3</td>
</tr>
<tr>
<td>8. Mail chutes or slots in walls or doors</td>
<td></td>
<td>1 2 3</td>
</tr>
<tr>
<td>9. Cracks in the foundation of the house or holes where pipes pass through walls</td>
<td></td>
<td>1 2 3</td>
</tr>
<tr>
<td>10. Where porches and steps meet the house</td>
<td></td>
<td>1 2 3</td>
</tr>
</tbody>
</table>